

reason for the procedure. So the student is helped to study and not merely to perform. One evidence of progress is the appreciation of the filter-pump at its true value: "When paper filters are employed, the use of a vacuum pump to promote filtration is of doubtful advantage in quantitative analysis"; its disadvantages "more than offset the possible gain in time." While the volumetric section is more extended than usual, the number of gravimetric exercises of a simple kind seems to us unduly few. After the determination of chlorine, iron, and sulphuric acid in simple salts, we pass to sulphur in an ore, phosphoric anhydride in a phosphate rock, and so on. Still it is better to do little thoroughly than much superficially. The ten pages devoted to the electrolytic determination of copper (1) with stationary electrodes, (2) with a rotating anode, is a part in which we think a few more practical exercises might have been introduced with advantage, but perhaps time does not permit of this in the laboratories of the University of Illinois.

(2) Prof. Hall has prepared this edition of "Classen," from the translation made six years ago, without further reference to the German text. Some new procedures have been added, and the order and the theoretical explanations have been somewhat modified. He says: "A simple application of the modern electronic theory seems to clarify rather than befog the vision of the beginner. An attempt, therefore, has been made to apply this theory a little more closely than has been done in most of the other well-known books on the subject." After 100 pages of introductory matter which describes in general terms electrolysis and the various details that affect it and its applications in analysis, the practical methods of determining twenty-nine metals are described, then methods of separating thirteen of the commoner metals from great varieties of other metals, and finally the electrolytic analysis of a considerable number of industrial products. The comparisons of various methods of depositing the different metals are often tabulated, so that a great amount of information is given in a comparatively small space, and the references to original communications being numerous, the student can turn at once to the full accounts of investigations if he wishes to pursue any particular matter. This edition of an authoritative treatise will be welcomed by all who are interested in the subject.

(3) In preparing the second edition of "Industrial Organic Analysis" Mr. Arup has added a chapter on sugars, some recently published methods, and references to the literature of the subject-matter. This last is an especially valuable feature, because the author has prepared the

volume for those who have had a "thorough training in chemistry and physics," and are therefore able to take full advantage of such assistance. The author not only gives methods of analysis, but also describes the details of manufacture or treatment of the material dealt with so far as is necessary to carry out with intelligence the analytical process and to interpret usefully the results. The subjects treated of are coal and coke, coal-tar and its distillation products, fatty oils and fats, soap, petroleum and its distillation products, milk and butter, starch and its decomposition products, flour, barley, and malt, sugars and alcohol, and preservatives and colouring matters in foods. These headings are interpreted liberally; for instance, we have under one or the other infants' foods, margarine, cocoa, the sterilising and pasteurising of milk, and so on. The author is eminently practical, but in no sense merely empirical.

(4) It will probably long remain a debatable matter whether a student's elementary course in chemistry should be pursued with a definite aim as to the use he is ultimately to make of it. This means more or less passing over subjects that appear to be of little or no importance to him, and expanding the treatment of matters that appear to bear specially upon his future work. But the future may bring into prominence the very subjects that are scantily treated. The authors in their "Foundation Course" include, besides general chemistry and a consideration of various inorganic materials, a little organic chemistry, devoting forty-four pages to aliphatic compounds and five pages to aromatic compounds. Physical chemistry is dealt with in twenty pages. To this extent the book provides a good general introduction to these subjects.

(5) Mr. Hendrick, with few exceptions, gives sound information and good advice in his little volume, but it is marred by a familiar style and such statements as "the temperature of the electric arc, which is about as hot as sizzling sinners getting their reward." C. J.

Oil Geology.

Popular Oil Geology. By Prof. Victor Ziegler. Pp. viii + 149. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1918.) Price 11s. 6d. net.

TO render any scientific subject into easy reading, to make such reading void of technical details while keeping strictly within the limits of accuracy and precision, is a problem tackled by many, but overcome only by few. To this few we may add the name of Victor Ziegler, who, in his

"Popular Oil Geology," has produced a remarkably neat and illuminating little volume which may be confidently recommended to all interested in the subject of petroleum technology.

Prof. Ziegler has condensed a very large subject into a comparatively small space, and it must be admitted that in but few instances have the principles of the science suffered from this treatment. The author has the obvious knack of extracting the real substance of the various branches of oil geology, and of presenting this without unnecessary "padding," so that the book really achieves its purpose of being an introduction to larger volumes dealing in more detail with the principles of the subject.

The chapters on the laws of the migration and accumulation of oil and gas, on oil structures and oil fields, and on prospecting are particularly good, while the final remarks on oil investments, culminating in a parody of John Hammond's rules for investors, are quite as amusing as they are apposite.

The book is profusely illustrated, a great many of the maps and diagrams being taken from the U.S. Geological Survey publications, as acknowledged in the preface. While this practice of reproduction is useful within limits, it is one that can be very easily overdone. To say that it shows lack of originality is possibly an exaggeration, but when such diagrams as that included on p. 77 occur again and again in various American publications we have examined, it seems disappointing that a new rendering of the same subject cannot be invented. But for that and the price (which for a book of this description is rather excessive), this little volume deserves a place on the bookshelf of the layman, student, and expert alike.

H. B. MILNER.

Our Bookshelf.

Ozone. By Prof. E. K. Rideal. (A Treatise of Electro-chemistry.) Pp. ix+198. (London: Constable and Co., Ltd., 1920.) Price 12s. net.

IN recent years ozone has attracted increasing interest on account both of its value as an aid to research in organic chemistry, and of its actual or possible applications on the industrial scale. The literature of the subject is, however, widely scattered, hence in compiling this monograph, which forms a section of the treatise on electro-chemistry in course of production under the editorship of Mr. Bertram Blount, the author has done good service to chemists.

An interesting introductory portion, which deals with the early history, the general properties, and the occurrence of ozone, is followed by five

chapters in which the methods of production—chemical, thermal, and electrolytic—and in particular production by means of ultra-violet radiations and of the silent electric discharge, are adequately described. These are succeeded by a summary of the principal investigations on the catalytic decomposition of ozone, and in the next chapter its more important industrial applications—e.g. in the sterilisation of water, the "purification" of air, the bleaching of oils and fats, and the manufacture of vanillin—are discussed in some detail. The last chapter contains an account of the methods of detecting and estimating ozone.

The author has been distinctly successful in his effort to collect and correlate the various references to ozone which occur in chemical literature, and his monograph will be welcomed if only for that reason. In addition, it contains a valuable summary of what is known—after all not very much—about ozone, and by indicating problems which remain to be solved should also serve to promote investigation. It is therefore all the more regrettable that several of the pages of an otherwise praiseworthy book are disfigured by grammatical errors, or by sentences so carelessly constructed as to be obscure in their meaning.

Microscopy: The Construction, Theory, and Use of the Microscope. By Edmund J. Spitta. Third edition. Pp. xxviii + 537 + xxviii plates. (London: John Murray, 1920.) Price 25s. net.

THE first edition of this work was reviewed in NATURE for February 6, 1908. The work has gained a well-deserved popularity, and two further editions have since been called for. In each of these the opportunity has been taken to bring the subject-matter so far as possible up to date, and to indicate important new developments. In the present edition may be noted especially the reference to low-power objectives designed to give great depth of focus and a flat field, valuable especially for the photography of relatively large specimens of appreciable thickness, where good definition has to be obtained of parts lying in different planes. To illustrate the use of these, a considerable number of new plates have been added, which include some admirable reproductions of photographs obtained with modern objectives of this type.

Mention must also be made of the photographs added to illustrate the use of the term "critical definition." Unfortunately, the term, though no doubt convenient, is not one to which a precise significance can be given, and it thus always presents difficulties to the learner, who comes to appreciate only by experience the sense in which it is employed.

The "Addenda," amounting to more than twenty pages, contain useful notes of some recent improvements, with a few convenient tables. Attention is directed especially to the use of the newer Kodak filters for obtaining blue light with a powerful illuminant, details being given. The index has been improved and additional references have been inserted, notably those to the pages of